

## Case Report

# Treatment of Chyloperitoneum After Extended Lymphatic Dissection During Duodenopancreatectomy

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## Summary

**Background.** Chyloperitoneum is a rare postoperative complication that might be caused by an interruption of chylous ducts in the mesenteric root or the cisterna chyli. Two cases of chyloperitoneum after duodenopancreatectomy are reported in the literature.

**Methods.** We here report the third case that developed a chyloperitoneum 2 wk postoperatively when he resumed his normal diet.

**Results.** The patient was treated conservatively with paracenteses and chyloperitoneum subsided thereafter.

**Conclusions.** Chyloperitoneum after extended duodenopancreatectomy might be treated conservatively.

**Key Words:** Chyloperitoneum; duodenopancreatectomy; conservative treatment.

## Introduction

Chyloperitoneum is a rare complication caused by an obstruction or interruption of chylous ducts and cysts in the mesenteric root, the cisterna chyli, or the thoracic duct. The most common etiological factors are primary lymphatic dysplasia (1), infections, like filariasis and tuberculosis, neoplasms invading or compressing the lymphatic ducts, and

surgery or radiation (2). Here the extensive loss of lymph nodes and collecting channels causes congestion of upstream lymph ducts. Lymphoductular regeneration proceeds by vascular budding or sprouting, thus leading to collateral lymph flow. Interestingly, lymphatic vessels do not regenerate when node-bearing areas are destroyed by radiation or excised surgically (3). It has been shown that lymph cysts may occur after single lymph node biopsies or removal of a large amount of connective tissue surrounding lymph nodes. Most of these lymph cysts remain asymptomatic. On rare occasions they may enlarge and compress adjacent structures, thus causing pain and bowel obstruction. Lymph cysts and chylous ascites following abdominal surgery are rare complications, but have been reported after various procedures, including abdominal aortic surgery

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(4–7), spinal surgery (8), nephrectomy (9), or dissection for testicular cancer (10), with interruption of retroperitoneal or mesenteric lymph structures being the common denominator (4,8,12–16). Most reports are anecdotal and hospital records list the incidence of diagnosis as 1 out of 100,000 admission (11). Chylous ascites after duodenopancreaticotectomy has only been reported twice (17,18). This is the third patient reported in the literature, who developed a chyloperitoneum after extended lymphatic dissection during duodenopancreatectomy.

## Case Presentation

A 75-yr-old male with an uneventful medical history was admitted after a single episode of acute epigastric pain. He also complained of acholic stools and dark brown urine. Physical examination revealed jaundiced sclera and integument and a localized tenderness in the upper abdomen. Pathological laboratory values included: bilirubin 179.7  $\mu\text{mol/L}$  (normal values  $<18.8 \mu\text{mol/L}$ ), bilirubin direct 136.6  $\mu\text{mol/L}$  ( $<5.1 \mu\text{mol/L}$ ), ASAT 177 U/L (10–50 U/L), ALAT 298 U/L (10–50 U/L),  $\gamma$ -GT 100 U/L (11–64 U/L), and AP 607 U/L (56–119 U/L).

Abdominal ultrasound as well as CT and MRI showed a dilatation of the intra- and extrahepatic bile ducts and a tumorous mass in the distal choledochus duct, suspicious of distal cholangiocarcinoma. A high-grade stenosis in the distal choledochal duct and a normal pancreatic duct was found on ERCP. After papillotomy and stent implantation the patient was scheduled for surgery.

## Surgery and Postoperative Course

An extended pylorus preserved duodenopancreatectomy with lymph dissection in the hepatoduodenal ligament, interaortocaval (Fig. 1) and around the SMA and TCA was performed. The patient was extubated postoperatively.

From the end of operation until the next morning, 300 mL of clear fluid drained through two easy-flow drainages placed at the pancreatic and biliary anastomosis. During the next 24 h a total of 100 mL fluid drained through the easy-flow drainages and the drains were removed thereafter.

Enteral feeding through a jejunal feeding tube was started on postoperative d (POD) 1, until POD 5, when oral feeding was started. A gastric emptying

delay protracted oral feeding for 2 d. The course thereafter was uneventful and the patient was discharged on POD 16.

Histologically a poorly differentiated, mainly solid and partly dissociative growing adenocarcinoma with neuroendocrine differentiation was found. Four out of 11 lymph nodes from the interaortocaval region contained metastasis. Interestingly, the rest of the lymphatic tissue, including peripancreatic lymph nodes, were without metastases. Neoplastic cells were mainly localized on the wall of the distal choledochal duct but not in the periductal zone. The carcinoma was classified as choledochal duct adenocarcinoma (T2, N2, M0).

## Second Admission

Five days after discharge the patient was readmitted with abdominal distension and coprostasis. He complained of abdominal discomfort and pain. On physical examination we saw a distressed patient with a distended abdomen and guarding on palpation but no peritoneal signs. Bowel sounds were normal and laboratory values, including electrolytes, hemoglobin, leukocytes, amylase, alkaline phosphatase, ALAT, ASAT, and  $\gamma$ -GT, were within normal limits. An abdominal X-ray showed coprostasis in the ascending colon, no fluid levels, or free air. Thoracoabdominal CT scan showed pleural effusions, pulmonary atelectasis, and free fluid in the abdomen without signs of bowel or biliary obstruction. A paracentesis was performed and 3 and 5 L of chylous fluid were removed respectively, after which the ascites subsided.

Laboratory values of the opaque peritoneal fluid were: sodium 132 mmol/L, potassium 4.3 mmol/L, pH 7.6, glucose 8.32 mmol/L, protein 33.3 g/L, cholesterol 1.52 mmol/L, triglyceride 0.99 mmol/L, LDH 207 U/L, lipase 22 U/L,  $\alpha$ -amylase 18 U/L. A cell count was performed that revealed cell number  $767 \times 10^6/\text{L}$  (normal  $0\text{--}4 \times 10^6/\text{L}$ ), mononuclear cells 96%, polynuclear cells 4%, erythrocytes  $1510 \times 10^6/\text{L}$ . In oil-red staining no extracellular fat was visible. Immunohistochemically a significant expression of CD-45 was visible. The T-cell/B-cell quotient was 5:1. These cytological examinations were suspicious for chyloperitoneum; however, chemically no significant cholesterol [58.77 mg/dL] and triglyceride [86.62 mg/dL] values were found.

Fig. 1

Fig. 1. Postoperative situs after interaortocaval lymphadenectomy. The cysterna chyli is usually located at the right side of the aorta (indicated by the arrow) where interaortocaval lymphadenectomy ought to be performed.

After the two paracenteses the patient improved clinically and maintained a stable weight. The patient was discharged 1 wk after admission and continues to do well 3 mo postoperatively.

## Discussion

Lymphatic capillaries collect and transport intestinal interstitial tissue fluid to valved collecting vessels. Interposed lymph nodes act as mechanical and immunological filters before emptying the lymph into the cysterna chyli intra-abdominally and finally into the bloodstream. The cysterna chyli is located on the anterior aspect of L  $\frac{1}{2}$  at the same level as the pancreatic head. It is located on the right side of the aorta, where interaortocaval lymph nodes ought to be dissected for lymphadenectomy during extended duodenopancreatectomy. Many distinct anatomic variants of the abdominal lymphatic plexus and the cysterna chyli are described that might render some patients at risk to develop chylous fistulae after extended interaortocaval lymphadenectomy (19).

Postoperative chylous ascites most often develops through fistulae between intestinal lymphatics or the cysterna chyli and the peritoneal cavity (20).

Although small lymph leaks are commonly seen intraoperatively (21) they rarely cause chyloperitoneum, because of extensive collateral lymph channels (20), or they remain asymptomatic and are therefore not recognized clinically.

Naturally, the risk of lymphatic leak is higher with extensive surgery, especially when a thorough interaortocaval lymphadenectomy is carried out, as in the case presented here. Noteworthy was the late development of chylous ascites, approx 2 wk after duodenopancreatectomy. Experimental studies demonstrate that flow-through lymphatic channels in the fasting state is <1 mL/kg/h but can increase to 225 mL/kg/h after a fatty meal (20,22), which might have been the case in our patient, who was on a restricted low-fat diet during this hospital stay, but resumed his normal diet after his discharge.

The diagnosis of chyloperitoneum is established by laboratory analysis of a chylous sample with cholesterol, triglyceride, and analysis of lipoprotein profiles being suggestive of chyloperitoneum. Triglyceride has been analyzed most extensively and values >110 mg/dL are highly suggestive of a chylous effusion (23). Treatment is imperative when patients develop respiratory symptoms or lose excessive amounts of fluid, protein, fats, vitamin K, and immunoregulatory lymphocytes (21). Those losses render patients susceptible to infections resulting from T-cell depletion (24).

Although some advocate early reoperation with fistula occlusion (after intraoperative localization of the fistula by feeding high-fat oral diets preoperatively) or by shunting the peritoneal cavity to the venous system (25), conservative management is the primary treatment and sometimes the only measure required (26). It consists of fat or medium-chain triglyceride-free diets and substitution with high protein contents or total parenteral nutrition. The formation of intestinal lymph and lymph flow is thus decreased to a minimum, which allows the fistulas to heal and close and the collaterals to open up (27,28). Treated that way, lymphatic leaks often heal spontaneously over the course of 1–2 wk under those conservative measures (18), which was the case in our patient, as well as in most other patients reported in the literature (Table 1). Adjunct measures like repeated complete paracentesis are effective for symptomatic relief, especially in dyspnoeic patients (20).

Table 1  
Chyloperitoneum: Comparison of Cases in the Literature Including the Authors' Cases

Reference	Cases	Operative procedure	Treatment	Outcome
Walker WM et al. (17)	1	Pancreatoduodenectomy	Paracentesis and diet → reoperation (small bowel obstruction)	Resolved
Fleisher HL et al. (25)	1	Abdominal aortic aneurysm resection	P-V shunt	Resolved in 4 wk
Ablan CJ et al. (15)	4	2× abdominal aortic aneurysm resection, 1× colon resection, 1× mesovaval shunt procedure	3× diet, 1× P-V shunt	3× resolved, 1× death
Pabst TS et al. (4)	27	3× abdominal aortic aneurysm resection, 2× resection of infected aortic grafts (own cases) 22× abdominal aortic surgery (previously published cases)	5× TPN 5× operative ligation, 5× P-V shunt, 4× TPN and diet, 8× only paracentesis and diet	Resolved all of 5 20 of 22 cases
Baniel J et al. (10)	18	Retroperitoneal lymph node dissection for testicular cancer	10× TPN, 1× paracentesis, 5× total parenteral hyperalimentation, 2× LeVeen shunt	Resolved in 2–12 wk
DeHart MM et al. (8)	3	Anterior spinal procedures	Retroperitoneal drains	Resolved
Geisler JP et al. (14)	2	Retroperitoneal lymph node dissection for endometrial (1) and fallopian tube (2) cancer	(1) Diet, hyperalimentation and paracentesis (2) Paracentesis and diet	(1) Recurrence of chylous ascites (2) Resolved
Panieri E et al. (6)	1	Abdominal aortic aneurysm resection	Paracentesis and diet	Resolved in 5 wk
Halloul Z et al. (7)	1	Ruptured infrarenal aortic aneurysm	3 wk paracentesis and diet → surgery → 5 wk TPN	Resolved in 12 wk
Halachmi S et al. (13)	1	Retroperitoneal lymph node dissection for testicular tumor	Reoperation (abdominal drain) and then diet	Resolved
Mladinic-Vulic D et al. (9)	1	Nephrectomy	Diet	Resolved in 2 wk
Gaglio PJ et al. (16)	2	Orthotopic liver transplantation	Paracentesis, TPN	Resolved
Bauwens K et al. (26)	1	Abdomino-thoracic esophageal resection	2 wk TPN, than reoperation and ligature	Resolved
Petrasek AJ et al. (20)	1	Right-to-left femorofemoral bypass	Paracentesis and TPN	Resolved in 1 wk
Cope C et al. (18)	2	Bowel obstruction post Whipple procedure (1) and abdominal aortic aneurysm resection (2)	2× PTCLD, P-V shunt (1)	Resolved
Haberal M et al. (12)	1	Partial liver transplantation	Reoperation	Resolved
Chen FP et al. (21)	4	Laparoscopic presacral neurectomy	2× laparoscopic cauterization, 1× laparoscopy twice and suture, 1× laparoscopy and diet	Resolved
Muller S et al. (5)	1	Abdominal aortic aneurysm resection	12 wk TPN → 12 wk diet	Resolved
Kolmar	1	Duodenopancreatectomy	Paracentesis	Resolved in 1 wk

<sup>a</sup>TPN = total parenteral nutrition, diet = low-fat diet, P-V shunt = peritoneovenous shunt, PTCLD = percutaneous transabdominal catheterization of the lymphatic ducts.

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